WHAT IS CLAIMED IS:

1. A plasma processing method which comprises supplying a processing gas to a vacuum vessel forming a plasma production part, producing a plasma using an antenna and a Faraday shield which are provided at outer periphery of the vacuum vessel and to which a high-frequency electric power can be applied, and carrying out the processing, wherein a voltage of at least 500 V is applied to the Faraday shield and a sample which is disposed in the vacuum vessel and which is a nonvolatile material as a material to be etched is etched.

2. A plasma processing method which comprises supplying a processing gas to a vacuum vessel forming a plasma production part, producing a plasma using an antenna and a Faraday shield which are provided at outer periphery of the vacuum vessel and to which a high-frequency electric power can be applied, and carrying out the processing, wherein a voltage of at least 500 V is applied to the Faraday shield and reaction products deposited on the inner wall of the vacuum vessel are cleaned.

3. A plasma processing method according to claim 2, wherein the processing gas is a mixed gas comprising boron trichloride and chlorine.

4. A plasma processing method according to claim 3, wherein the processing gas is supplied so that the mixed gas comprises 20% of boron trichloride and 80% of

chlorine, thereby cleaning the inner wall of the vacuum vessel.

5. A plasma processing method according to claim 2, wherein a voltage of at least 1500 V is applied to the Faraday shield.

6. A plasma processing method which comprises supplying a processing gas to a vacuum vessel forming a plasma production part, producing a plasma using an antenna and a Faraday shield which are provided at outer periphery of the vacuum vessel and to which a high-frequency electric power can be applied, and carrying out the processing, wherein the method comprises the first step of carrying a dummy wafer onto a sample stand, applying a voltage of at least 500 V to the Faraday shield and removing foreign matters in the vacuum vessel with a plasma using a gas containing chlorine, the second step of etching a sample which is disposed on the sample stand in the vacuum vessel and which is a nonvolatile material as a material to be etched after the first step, and the third step of applying a voltage of at least 1500 V to the Faraday shield after the second step, and removing reaction products in the vacuum vessel using a mixed gas comprising boron trichloride and chlorine.

7. A plasma processing method which comprises supplying a processing gas to a vacuum vessel forming a plasma production part, producing a plasma using an antenna and a Faraday shield which are provided at

outer periphery of the vacuum vessel and to which a high-frequency electric power can be applied, and carrying out the processing, wherein the number of foreign matters in the vacuum vessel is detected by a monitor for foreign matters, cleaning by applying a voltage to the Faraday shield is carried out in case the number of foreign matters exceeds a given upper limit and the cleaning is terminated in case the number of foreign matters decreases below a given lower limit.

8. An apparatus for plasma processing which has a vacuum vessel forming a plasma producing part, a gas supplying means for supplying a gas to the vacuum vessel, an antenna generating an electric field in the plasma producing part, a Faraday shield provided at outer periphery of the vacuum vessel, a high-frequency electric source supplying a high-frequency electric power to the antenna and the Faraday shield, and an end point determination and detection means, said end point determination and detection means detecting the end point of cleaning of the inner wall of the vacuum vessel by detecting emission wavelength of reaction products.

9. An apparatus for plasma processing which has a vacuum vessel forming a plasma producing part, a gas supplying means for supplying a gas to the vacuum vessel, an antenna generating an electric field in the plasma producing part, a Faraday shield provided at outer periphery of the vacuum vessel, a high-frequency

electric source supplying a high-frequency electric power to the antenna and the Faraday shield, and an end point determination and detection means, said end point determination and detection means detecting the end point of cleaning of the inner wall of the vacuum vessel by detecting emission wavelength of a material of the vacuum vessel.